

## Get Creative with Polynomials (30 points)

In this project you will use your imagination to create a building or area (e.g., park, zoo habitat, space station, museum, sports complex). There are four parts to complete:

- **Math** – Find the area of your construction in terms of an unknown value. All dimensions used to find the total area, whether length, width, or radius, must be represented by linear binomials.
- **Writing** – Describe how you derived your linear binomials, what your variable and constant terms represent, and how the side lengths relate to one another. Explain how you arrived at your final polynomial, i.e., explain how you used FOIL or a special product formula to arrive at your final polynomial. Describe the purpose of the construction, how people will use it, and the benefits of the design (why did you choose a rectangular or circular layout?).
- **Drawing** – Draw a view of your construction from above to show the arrangement of rooms or sections. Label your drawing with the measurements and the names of the rooms or sections.
- **Display** – Display your work neatly and creatively on a poster board.

### Rubric

#### *Math*

- \_\_\_\_\_ Design includes two linear binomials that are multiplied together to find the area (3)
- \_\_\_\_\_ Area is correctly expressed as a simplified polynomial and all work is shown (5)
- \_\_\_\_\_ Units are included - arbitrary unit<sup>2</sup> is fine (1)

#### *Writing*

- \_\_\_\_\_ Two paragraphs, complete sentences, typed, correct grammar and spelling (3)
- \_\_\_\_\_ Describes what the terms in the linear binomial represent (2)
- \_\_\_\_\_ Describes the steps involved in writing the final polynomial (2)
- \_\_\_\_\_ Describes the purpose and use of the construction and the benefits of the design (2)

#### *Drawing*

- \_\_\_\_\_ Used a ruler and/or compass – neatly presented (2)
- \_\_\_\_\_ All measurements needed to write the linear binomials and final area polynomial are listed (2)
- \_\_\_\_\_ All elements (rooms, sections, areas) are labeled with descriptive terms (2)

#### *Display*

- \_\_\_\_\_ All elements, including a title, are arranged neatly on the board (4)
- \_\_\_\_\_ Board is embellished with relevant photos or drawings (1)
- \_\_\_\_\_ Sources are cited (ideas, quotes, and images) (1)

Area of the Entire  
"Cupcake Tasting Area"

$$A = (3x+2)^2$$

$$A = (3x+2)(3x+2)$$

$$A = (3x+2)(3x+2)$$

$$F: 3x \cdot 3x = 9x^2$$

$$O: 3x \cdot 2 = 6x$$

$$I: 2 \cdot 3x = 6x$$

$$L: 2 \cdot 2 = 4$$

$$A = 9x^2 + 6x + 6x + 4$$

$$A = 9x^2 + 12x + 4$$

# Get Creative with Polynomials

Math Design Project





Lacrosse Field



my game

The lacrosse field benefits from being a rectangle because it is easier to run lines and run down the side without curving around. It would make the game much harder for running down the side lines because you would have to curve in while running. Also the length of the field would decrease dramatically. There would be much less room to spread out and run. It would make it a lot easier to defend because there is a smaller area to cover.

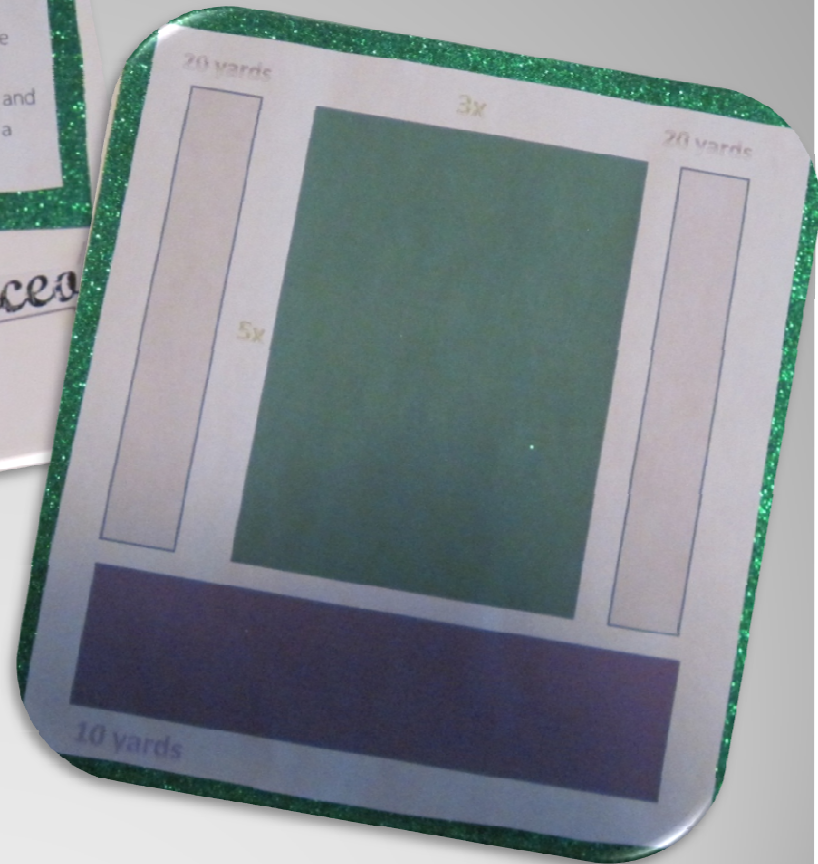
First I got the width of the field to be  $3x$ . Next I had to add on the width of the bleachers which added on another 20 yards on each side to get 40 yards in total. Then I make a polynomial of  $3x+40$ . Then I had to find the length of both the field and the field including the concession stand. I labeled the length of the field by itself as  $5x$ . Then once I included the concession stand on both sides I got  $5x+10$ . Once I found that I had to multiply them together like so:  $(3x+40)(5x+10)$ .

Faces

$$(3x+40)(5x+10)$$

$$3x \cdot 5x + 3x \cdot 10 + 40 \cdot 5x + 40 \cdot 10$$

$$15x^2 + 230x + 400$$



# Lacrosse Field





Horse Barn

## Overview

Additional Information

## Area of the Entire Barn

A hand-drawn floor plan of a horse barn, labeled "Main Barn" at the bottom. The plan is divided into several sections:

- Arena:** A large rectangular area at the top, labeled "Arena". It is surrounded by a "Rail of the Arena". The width is marked as 30' on the right and 100' on the left. The length is marked as 100' on the left.
- Hallway:** A central hallway runs vertically, labeled "Hallway". It is 10' wide.
- Stalls:** There are three rows of stalls on either side of the central hallway. Each stall is 6' wide and 12' long. The stalls are labeled "Stall".
- Other Rooms:**
  - Restroom:** Located at the top left, 10' wide and 12' long.
  - Tack Room:** Located at the top right, 10' wide and 12' long.
  - Feed Room:** Located at the bottom right, 10' wide and 12' long.
  - Wash Stall:** Located at the bottom left, 10' wide and 12' long.
  - Launder Room:** Located at the bottom center, 10' wide and 12' long.

The overall dimensions of the barn are 100' by 100'. The stalls are arranged in a grid pattern, with a central hallway and side hallways. The plan is drawn on a piece of paper with a red border and green grass-like patterns.

# Horse Barn



# Visit to the Museum



## Visit to the Museum

The exhibit complex consists of 2 exhibits and 4 platforms. One of the exhibits is the butterfly conservatory for viewing different kinds of butterflies. Magnifying glasses are available to visitors to view the butterflies up front and close. The exhibit has a length and width ratio of 4:3. Two platforms sit on either side and run the length of the butterfly conservatory exhibit. The second exhibit is the journey to the stars for viewing the solar system is a much closer version. 3-D glasses are available to guest for viewing the 3-D planets. The exhibit has a length and width ratio of 4:3. Two platforms sit on either side and run the length of the journey to the stars exhibit.

## Butterfly Conservatory

The butterfly conservatory is a place where visitors can learn more about butterflies. There are butterfly cams to view the reproduction and growth of butterflies. Visitors have the chance to hold the butterflies in their hands. Visitors can take picture with the butterflies in their hands. Also, they can purchase their own caterpillars to make them into butterflies.



## Journey to the Stars

The journey to the stars is a place where visitors can learn facts about the solar system (mainly based on the Earth and Space perspective). Visitors can view space through a telescope pictures. They can learn the birth and death of stars. Visitors can tour stellar formations, explore new celestial mysteries, and discover the fascinating story that connects us to the all of the stars.

## Sources

American Museum of Natural History. Photo. 31 March. 2012. <<http://www.destination360.com/north-america/us/new-york/nyc/american-museum-of-natural-history>>

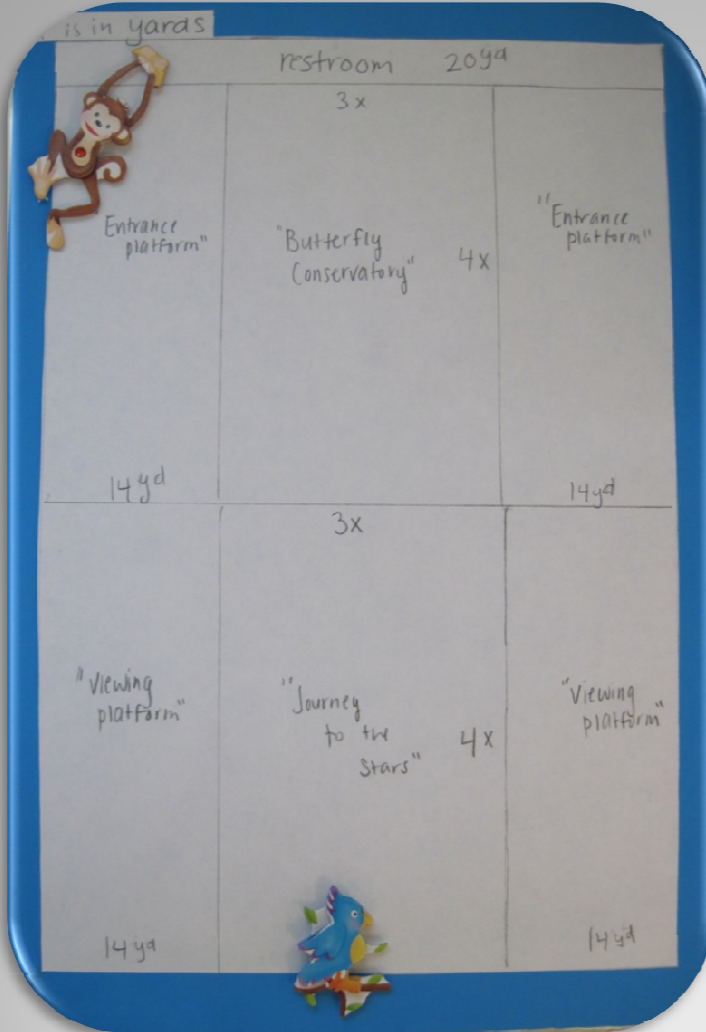
Butterfly Conservatory. Photo. 31 March. 2012. <<http://cityguidenyc.com/article/NYC-Indoor-Winter-Family-Fun>>

Journey to the Stars. Photo. 31 March. 2012.  
<<http://www.amnh.org/education/resources/rfl/web/starsguide/continue.html>>



# Museum





Area of entire visit to museum complex

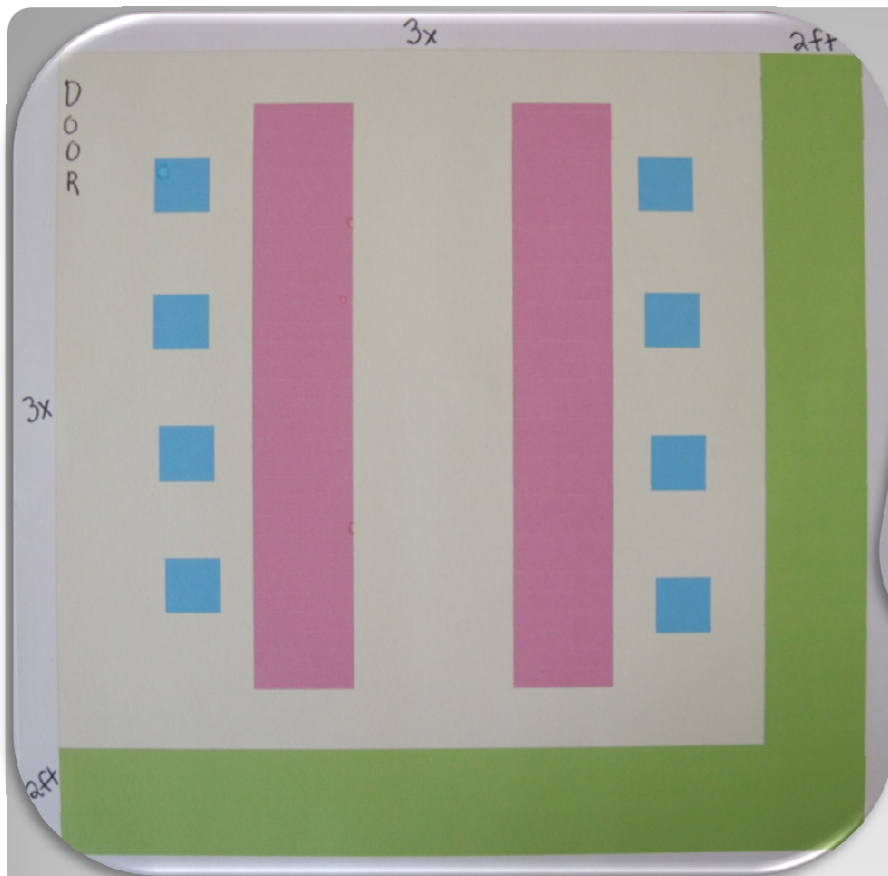
$$\begin{aligned}
 A &= (3x + 28)(8x + 20) \\
 &= 24x^2 + 60x + 224x + 560 \\
 &= 24x^2 + 284x + 560 \text{ yd}^2
 \end{aligned}$$



**Museum**







Mathematics

17 April 2012

### "Cupcake Tasting Area"

The "Cupcake Tasting Area" mainly consists of a long counter. The counter covers two walls and joins together at the corner. Each half of the counter is the length of the floor which is  $3x$ . The width of the counter is 2 feet. The counter is designed for the employees to place cupcakes and touch-up any flaws on the cupcakes. The counter also provides a spaced out area to inspect and perfect the cupcakes.

The construction that I have designed is the "Cupcake Tasting Area." This area is where people will come in to a cupcake shop and eat the cupcakes that the shop provides. Each taster will then record their thoughts about the cupcake on a sheet of paper. Anybody is allowed to come in to this room and test. This design can benefit cupcake shops by allowing customers to test the particular shop's cupcakes. This room can also be used with candy, cake, pie, brownies, cookies, and any other type of food.

### Area of the Entire "Cupcake Tasting Area"

$$A = (3x+2)^2$$

$$A = (3x+2)(3x+2)$$

$$A = (3x+2)(3x+2)$$

$$F: 3x \cdot 3x = 9x^2$$

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$$A = 9x^2 + 6x + 6x + 4$$

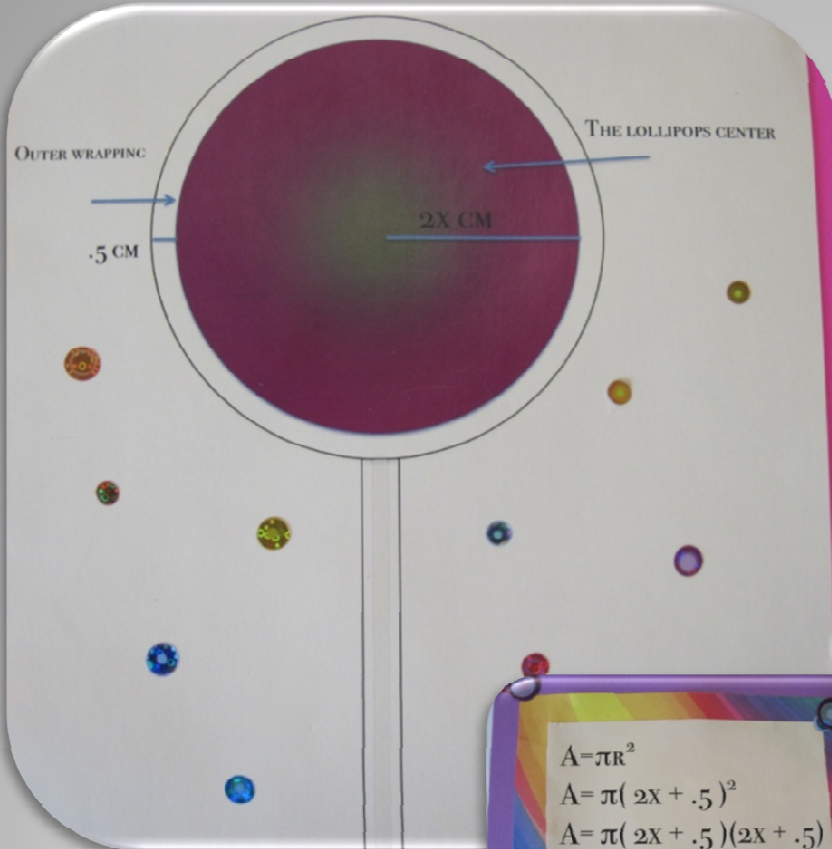
$$A = 9x^2 + 12x + 4 \text{ ft}^2$$

# Cupcake Tasting Area





**Lovely Lollipop**



$$\begin{aligned}
 A &= \pi r^2 \\
 A &= \pi (2x + .5)^2 \\
 A &= \pi (2x + .5)(2x + .5) \\
 &= 4x^2 + 1x + 1x + .25 \\
 A &= \pi (4x^2 + 2x + .25)
 \end{aligned}$$

TO DETERMINED THE RADIUS OF BOTH THE LOLLIPOP AND THE WRAPPER I USED THE  $A = \pi r^2$  FORMULA. FOR THE LOLLIPOP, I USED 2X CM AS THE RADIUS AND FOR THE WRAPPER I USED .5 CM. ALL I DID AFTER THAT WAS PLUG THE  $2x + .5$  AND SQUARED THAT. I USED THE FOIL METHOD AND ENDED UP WITH  $4x^2 + 1x + 1x + .25$ . I COMBINED LIKE TERMS WHICH WERE  $1x + 1x$  AND GOT  $2x$  WHICH WAS THE FINAL ANSWER.  $A = \pi (4x^2 + 2x + .25)$  THAT IS THE TOTAL RADIUS OF BOTH THE LOLLIPOP AND THE WRAPPER AROUND IT.

THE LOLLIPOP IS A CIRCLE BECAUSE IT IS MORE COMFORTABLE IN YOU MOUTH. ALSO SO YOU CAN LICK IT EASIER AND SO IT WONT CAUSE PAIN INSIDE YOUR MOUTH.

# Lovely Lollipop